

Brookhaven National Laboratory National Synchrotron Light Source		Number: LS-ESH-0013	Revision: B
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Subject: Controlled Access to the VUV Ring (Non-Maintenance Period)			
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1.0 PURPOSE

Controlled access to the VUV ring is necessary for maintaining personnel safety and stability to the accelerator beam and equipment.

2.0 SCOPE

The VUV ring area is a controlled area that has several personnel hazards. These hazards primarily consist of radiation and electrical. All persons entering the VUV ring need to be aware of these hazards prior to entry.

3.0 RESPONSIBILITY

Person(s) Accessing VUV Ring: Training for access to the VUV ring must be completed prior to requesting entry. Access to the ring must only be via the main entrance gate. All rules and instructions stated in this document must be followed to maintain beam stability, equipment stability and personnel safety.

Control Room Operator(s): The Control Room Operator may only permit trained personnel or visitor(s) escorted by trained personnel to enter the VUV ring. Record all entries in the Control Room Operator's Log with use of the VUV access stamp. The Operator may only permit a maximum of 5 persons in the VUV ring at a given time. The Operator must follow all specified instructions mentioned below.

4.0 PROCEDURE FOR CONTROLLED ACCESS TO THE VUV RING

4.1 Any Controlled Access to the VUV ring must be controlled by the person who is acting as Control Room Operator (CRO) at that time. Persons qualified for this position include the NSLS Operators, and the NSLS Operations Coordinators.

4.2 Every entry and exit under a controlled access must be logged in the Control Room Operator's log in the following format:

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VUV Ring Controlled Access

Time Start_____Ring Status_____Time End_____

Name	Time in	CRO	Time out	CRO

- Important:**
- ▶ This format must be used since it permits easy verification that everyone who has entered the ring has come out.
 - ▶ *The blank for "Time Out" should not be left empty.* For example, if the interlock is dumped when people are on access, write "*intl dumped*" in the "Time Out" slot rather than leaving it blank.
 - ▶ Names may be abbreviated so long as there is no ambiguity.
 - ▶ The operator who controls the entry or exit shall initial the appropriate "CRO" column for the person(s) listed.

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- 4.3 The maximum number of people inside on access at one time is FIVE. In other words, there should never be more than five empty blanks in the "Time Out" column.
- 4.4 The people who enter the VUV ring area on controlled access must complete the training for "Controlled Access to the VUV Ring" (Course # LS-VUV ACCESS).
- a) A person may become qualified for access by reading the procedure "Controlled Access to the VUV Ring" and signing the ["VUV Controlled Access Certification" form](#) (also located in the NSLS control room). Submit the completed form to the Control Room Operator on duty.
 - b) A list of personnel qualified for access will be maintained in the BTMS database and in the NSLS control room.
 - c) If there is reason to take a visitor into the ring, this may be done by an escort who is qualified for access. The escort is responsible for the visitor's safety during the access.
 - d) The refresher training frequency for this course is every 2 years.
- 4.5 The access process consists of the following steps:
- 4.5.1 The person(s) desiring access to the VUV ring make the request and give the name(s) to the Control Room Operator (CRO). This may be done ahead of time or when the party is ready to enter at the gate.
 - 4.5.2 The CRO verifies that the proposed access is consistent with machine operation, then stamps the header in the logbook and enters the names.
 - 4.5.3 The access party calls the control room using the gate intercom and informs that they are ready for access, and repeats the names.
 - 4.5.4 The CRO switches the mode key to "Access" and verifies that there is satisfactory surveillance by TV and that the named people are at the gate.
 - 4.5.5 The CRO holds down the "Gate Bypass" switch and informs the access party that they have permission to enter.
 - a) The switch must be held until the gate is closed again as confirmed by the "gate closed" pilot light on the control panel, otherwise the interlock will be dumped.
 - b) The access party must close the gate behind them after entry in order to satisfy the interlock system.
 - 4.5.6 The CRO enters the entry time for each person in the logbook and initials each entry. There must be an entry for each person since they may exit at different times.
 - 4.5.7 When any person wishes to exit, they call the CRO on the intercom at the gate and request to exit.
 - a) The CRO verifies on the TV, then holds the gate bypass and gives permission to exit, releasing the switch when the gate shows closed.

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- b) The person(s) exiting the ring must not push or pull on the entrance door until permission is given.
- c) The CRO puts the exit time in the log and initials it, thus closing out that person's entry/exit cycle.
- d) If that person goes in again, there must be a new line in the log record.

4.5.8 When all people are out, the CRO confirms that the log record of the access has been reconciled, then turns the key switch to "Normal" mode. The warning alarm will sound in the VUV area for 10 seconds.

4.6 Control Room Priorities:

Servicing requests for entry or exit from the VUV area may be delayed if there is something more important going on in the control room, although requests for exit should be accommodated as soon as possible. However, once an entry or exit process has been initiated, that action must be completed, including the record in the logbook. The logbook entries are particularly important since decisions affecting personnel safety may be made based only on that record.

5.0 VUV RING ACCESS SAFETY ORIENTATION

5.1 There are three primary considerations involved in ring access to the VUV when there is stored beam: Radiation safety, Electrical safety and avoiding disturbance to the stored beam. These risks can be controlled at acceptable levels, but careful attention to procedures, and knowledge of storage ring systems is necessary.

5.1.1 Radiation

When there is stored beam in the ring, the radiation level in contact with the ring vacuum chamber in some locations can be higher than 100 mR per hour.

- a) Shielding inside the ring reduces the level to below 5 mR/hr in places where a person can stand, and in most places the radiation is much lower than that.
- b) The restrictions on work locations noted below will keep possible radiation exposures well below the 5 mRem/hour level.
- c) The total radiation caused by an accidental beam dump will also be below 5 mrem in the areas where access is allowed.
- d) During injection into the ring the radiation levels can be as much as 10 times higher and the hot spots may move around as adjustments are made on injection.
- e) Occupation of the VUV ring area is not permitted during injection and the interlock system procedures are designed to prevent this.

5.1.2 Electrical Safety

A notable electrical hazard in the ring is from the high current and high energy associated with the ring magnets.

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- a) The bus work and connections for these magnets are covered to prevent contact, but these covers could be penetrated by plumbing tools used nearby, cables being pulled, or metal measuring tapes.
- b) The work rules listed below are designed to avoid these hazards.

5.1.3 Stored Beam Stability

Workers in the VUV ring must be aware that seemingly innocuous actions could dump or disturb the stored beam.

- a) These include changing the range on a vacuum or other gauge, creating electrical noise, or loading circuits.

5.2 Rules and Restrictions on Activities in the VUV Ring During Controlled Access

- 5.2.1 Anyone inside the VUV ring on controlled access shall remain at least two feet away from the beam vacuum chamber. As a reference, the backs of the shielding buckets are between 12 inches and 2 feet from the chamber.
- 5.2.2 No task may be undertaken which requires work outside the boundary consisting of the ring of pipes and conduit which is below and inside of the magnet ring. This includes work in cable trays above and below the magnets.

Note: There may be tasks which violate these restrictions but can be done safely if proper precautions are taken. Such proposed tasks shall be approved by the NSLS Safety Officer or Safety Engineer. Technical review and/or written procedure may also be required.

- 5.2.3 Any person working in the VUV ring on controlled access is responsible for getting information about the effect of the proposed work on stored beam stability.

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